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PROJECT WM-10

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PROJECT WM-10

Mr. John H. Anttonen, Assistant Manager
 Office of Assistant Manager for Project
 and Facility Management
 Department of Energy
 825 Jadwin Ave.
 P. O. Box 550
 Federal Building, Room 663
 Richland, WA 99352

Dear Mr. Anttonen:

The NRC staff now has under review the Site Characterization Report (SCR) for the Basalt Waste Isolation Project (BWIP), which was submitted to the NRC on November 12, 1982. In view of our understanding that DOE plans to start exploratory shaft construction as early as possible, and potentially before completion of our draft analysis of the SCR, we want to bring to your attention additional information the NRC staff considers necessary in the area of exploratory shaft construction and sealing, above that included in the SCR.

One of the important considerations in developing and carrying out site characterization programs is that the site characterization activities not compromise subsequent long term isolation and containment capabilities of the repository. This concern has been articulated in 10CFR60.11(a)(6)(iii), which calls for a description in the SCR of "provisions to control any adverse safety-related effects from site characterization including appropriate quality assurance programs." Similar language is in section 113 (b)(1)(A)(ii) of the Nuclear Waste Policy Act of 1982. However, the SCR does not provide or reference detailed information concerning construction and sealing programs for the exploratory shaft and associated quality assurance (QA) and testing procedures as they relate to this concern. A design and construction quality assurance plan is mentioned but not presented (see pg. 14.3-73 of SCR).

It should be noted that the NRC staff identified the need for early attention in this area on several occasions over the past year (NRC letter of Aug. 6, 1982, Wright to Squires, and of Nov. 5, 1982, Miller to Anttonen). In meetings over the past year, the staff also reviewed concerns regarding shaft construction techniques (September, 1981) and

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shaft sealing issues (October 4-6, 1982). However, detailed information discussed in these meetings has not been included in the SCR and we are unable to determine whether or not information and plans discussed in the recent workshop are firm.

The basic concern here is with the potential adverse effects due to penetration (e.g., exploratory shaft) of the repository horizon during site characterization. A shaft construction process that takes into account long term sealing aspects is required. The documented information needed by the NRC on the exploratory shaft relates to five areas: 1) shaft and seal design considerations 2) construction procedures to be used, 3) sealing or grouting procedures, 4) testing and inspection procedures, and 5) quality assurance for all of the above. The general type of information considered necessary by NRC on the above items is presented in the attached list. If DOE considers other information is also applicable to the basic concern, this information should also be provided. To the extent we were able to evaluate such information in the recent (October, 1982) design workshop, DOE plans seemed to be appropriate, but there is no documentation in the SCR.

We recognize that documented plans for shaft construction and sealing may have to be changed based on experience during construction and we should be informed of significant changes as they occur. Also, we presume that as meeting the requirements in the new Nuclear Waste Policy Act impacts your schedules, you will inform us of schedule changes. Among other reasons, this is needed since NRC staff expects to visit the site and observe excavations and tests as they are done as contemplated by 10 CFR 60.11(g).

In addition, we consider it prudent that the plan for obtaining site characterization data during shaft construction be identified before construction proceeds to the point where obtaining such data is precluded. Some significant and unique information about site properties (e.g., groundwater response to shaft sinking; rock strength and consistency; and feasibility of using blind boring as a construction technique) could be obtained during shaft sinking.

While all of the information noted in the attachment need not be documented prior to starting shaft construction, we consider it prudent that it be provided early enough for us to complete our review and for you to make any adjustments necessary as a result of comments we may have. For example, grout designs may not be complete now, but could be

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provided well in advance of grouting the liner. We are willing to discuss those areas with you.

Please contact me at your earliest convenience regarding this matter.

Sincerely,

ORIGINAL COPY
Hubert J. Miller

Hubert J. Miller, Chief
High-Level Waste Technical
Development Branch
Division of Waste Management

Enclosure:
As Stated

cc: F. Coffman, DOE
W. Ballard, DOE

See previous concurrences for Rhoderick, Greeves, Wright, Miller and Olmstead

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**INFORMATION CONSIDERED NECESSARY RELATED TO
EXPLORATORY SHAFT CONSTRUCTION AND SEALING**

I. Shaft and Seal Design Considerations

- Provide an analysis of the potential effects of construction of the exploratory shaft on long-term sealing capabilities of the rock mass and identify factors that determine the nature and extent of such effects
- Describe how the selected excavation technique and shaft design accounts for limitations and uncertainties in long term sealing considerations
- Provide design specifications for the shaft construction and show how they deal with the factors affecting sealing.
- Describe the grout and chemical seal design
- Discuss the selected locations of the portholes. Include discussion of data on sealing characteristics to be gathered through the portholes and the limitations and uncertainties associated with the data

II. Construction Plans and Procedures

- Identify the acceptance criteria for construction of the exploratory shaft
- Identify procedures used to minimize damage to the rock penetrated
- Identify liner construction and placement technique. Include information on topics such as: liner type, liner material testing, welding of liner, placement of liner. This information needs to be fully considered in application of any permanent sealing program.

III. Seal or Grouting Plans and Procedures

- Describe how the grouts and chemical seal are expected to perform in sealing the exploratory shaft. Describe tests done, both laboratory and field, to determine their long-term durability and their compatibility, both chemical and physical, to the host rock environment
- Describe the placement methods to be used including the limitations and uncertainties of the methods
- Describe remedial methods to be used if sealing methods are not adequate

IV. Testing and Inspection Plans and Procedures

- Describe test and inspection procedures to be used during drilling (e.g., plumbness of hole, drill mud loss, drill bit inspection, etc.) to determine acceptability of the shaft as constructed and to obtain adequate information on this construction technique.
- Describe test and inspection procedures to be used after completion of drilling and during the sealing of the shaft. Include information such as caliper surveys, grout injection rate, grout level sensor, cement bond log, thermal measurements during curing etc.
- Describe test and inspection procedures to be used after sealing of the shaft to assess the results of the sealing effort in controlling adverse effects. Include information such as grout strength tests, visual identification of seal conditions, records of water inflow, assessment of seal bond to host rock, physical logging of drill holes, photo or T.V. camera methods in all portholes

V. Plans and Procedures for Gathering Specific Information Related to Site Characterization

- Describe test plans and procedures used to obtain adequate data on site characteristics that can be measured either directly or indirectly during construction of the exploratory shaft. For example:
 - o Will hydrologic conditions [heads] in nearby drill holes be measured during shaft construction to help understand bulk hydrologic properties?
 - o Will the following be monitored: Sampling of drill cuttings, bit thrust, torque, rate of advance, slurry weight, speed of rotation, pumping pressure, water inflow? This information can be used to detect and/or explain anomalies encountered?
- Identify all parameters to be measured and methods of measurement.

VI. Quality Assurance (QA)

Administrative Procedures

- Identify the line of responsibility for implementing QA procedures down to and including the Construction Contractor (10 CFR 50 Appendix B, Criteria I requires that "organizations performing quality assurance functions shall report to a management level such that this required authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety consideration, are provided")
- Identify the procedures for monitoring and implementing the QA program by the Quality Assurance organization of exploratory shaft design, construction and testing.

NRC contractor comments on the Exploratory Shaft program and "Evaluation of Alternate Shaft Sinking Techniques For High Level Nuclear Waste (HLW) Deep Geologic Repositories", NUREG/CR-2854, are attached. These documents were considered by the NRC staff in developing the above

requested information. These are attached for information to provide background on the above items.